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Inventors: David A. Kranz, Robert Halstead Jr. and Tom Lyons  
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## URL SYSTEM AND METHOD FOR LICENSING CONTENT

### BACKGROUND

As the software industry has evolved over the years, there have been a myriad of ideas and methods for licensing and restricting access to digital content. Increasingly, the trend among content developers is to incorporate some form of digital rights management. Generally, digital rights management licensing schemes require some type of security measure in order to restrict access to protected digital content. Some of the commonly incorporated security measures include passwords, biometric thumbprints, encryption, digital signature techniques and serial numbers locked to hardware, such as individual PCs or dongles. Such security schemes, however, come at a high price. Not only do they typically place heavy burdens and ultimately inconvenience the user, they also can result in significant overhead costs because of the time and maintenance burdens on the developer and content provider.

In today's dynamic global environment, the critical nature of accuracy and speed can mean the difference between success and failure for a new software product or even a company. The process of deploying security schemes to protect access to digital content is long, involved and expensive. The difficulties of this process are compounded by the unique challenges that companies face to satisfy their customers expeditiously in order to survive in this dynamic global environment.

Content users want unfettered access to digital content without being required to undergo a burdensome authentication process. A licensed product that requires a user to navigate through a lengthy authentication process or security scheme will likely be unsuccessful. Moreover, users do not want to have to pay for the added cost of a

security measure attached to digital content. Meanwhile, content providers want a security scheme that is easily implemented and enables them to effectively deploy content and garner a financial return without encumbering the content users. Software developers also want a mechanism that enables them to have a financial return. Thus, one of the most complicated aspects of developing a security model for deploying content is finding a scheme in which the cost benefit analysis accommodates all participants, i.e. the content user, content provider and software developer. At this time, the currently available schemes do not provide a user-friendly, developer-friendly and financially effective solution to restrict access to digital content.

## SUMMARY

To address many of the above-mentioned problems, licensing techniques have been designed that allow users to have relatively unencumbered access to digital content, while software developers and/or content providers are provided with a mechanism to secure a financial return. This is achieved by embedding, within the content, licensing information. Software that accesses the content may be distributed to clients, perhaps at no charge, and that software checks the licensing information before permitting the content to be rendered. In this approach, the end-user does not need a license to play the content. Rather, the license is for the server to deploy the content, and the license is only checked by the software running on the client. As a result, the end-user of the client system can be unaware of this licensing process. Aspects of these licensing techniques are described in U.S. Patent Application Nos. 09/267,269 and 09/936,768, the entire teachings of which are incorporated herein by reference.

In accordance with the present invention, the above concepts are extended to a licensing method and system whereby licensing information does not need to be embedded with the content. Rather, the licensing information is separate from the content. A Uniform Resource Locator (URL) address of digital content on a server computer system may be used to obtain licensing information that is in a separate

location than the digital content. When the license is located, it is examined to confirm that the content is covered by the license.

In one embodiment of the invention, a client computer system downloads licensed content from a server computer system. When the client receives the content  
5 from the server, client software can automatically look on the server for a license that covers the content. To determine the location of the license on the server, the software uses the content's URL as a point of reference. If the license can be located, it can be processed or examined to verify that it is authentic. This can be performed, for example, by verifying a digital signature in the license.

10 Once the license is verified, it can be processed to determine which URL address is covered by the license. To determine this, the license is examined for information about a URL pattern referenced in the license. The URL pattern can identify one or more licensed deployment locations. The URL pattern can be a URL address, hostname or URL prefix identifying the URL addresses which are covered by  
15 the license. Content coming from those URL addresses may be considered licensed. When the URL pattern has been determined from the license, the pattern can be compared with the URL address of the content on the server. If, for example, a domain name identified in the URL pattern matches the domain name in the content's URL, then the license may be the correct license for the content.

20 A software system may be designed to facilitate a licensing process. The software can be used for downloading the content from a server and verifying a license for the content. The software usually includes routines or objects designed to recognize and validate the license on the server. For example, the software may include a licensing manager that handles the licensing process. The software may include a  
25 communications handler, which is responsive to requests to download licensed content from a server. The software may include one or more routines, which are used to locate the license, verify its authenticity and determine which URL address is covered by the license. The software may be installed on a client system or on a distributed system. The software, for example, can be the client's runtime environment, media player,  
30 applet, plug-in or web browser. The software may communicate with the server using,

for instance, HTTP and TCP/IP protocols, to download the content and locate the license. If the license is authenticated and it is the correct license for the content, the software is allowed to run or play the content on the client system.

5 Features or policies associated with the license may be determined from the license. For example, the license may include restrictions under which the content is made available. The license may indicate that certain features of the content may be enabled or disabled. The invention may recognize and validate a license from the server and limit processing of, or access to, the content pursuant to the validity or terms of the license.

10 A single license may cover several different deployment locations. If, for example, the content on the server is an application, one license can cover multiple application URLs, applications from multiple directories and also multiple hostnames. Software can be used to look for the license through the root directory of the URL address of the content. A license stored through the root directory can override or  
15 preempt licenses located elsewhere on the server. If a license is not found through the root directory, then the software may look for a license through the subdirectory of the URL address of the digital content.

A license may also be cached on the client system. This can be particularly useful when the license includes a URL pattern that refers to multiple URL addresses of  
20 content, such as several applications, that are covered by the license. A cached license can enable the client system to continually access all content covered by the license without having to expend system resources, such as bandwidth, because the client does not need to go back to the server each time it needs to determine whether the content it is downloading is licensed.

25 The license may include a license key. The license can be checked to determine whether the license has been altered. The license may include a digital certificate. The license may be encrypted. The license can operate under a licensing model, such as a non-commercial use or pay-per-use licensing model.

A licensing mechanism may be supported wherein the provider of runtime  
30 software, which is utilized in the interpretation of web content, may license the use of

web content that may be played with that software without controlling access to either the software or the web content. For example, the provider can distribute the runtime software freely to the user and the runtime software can be installed on client systems to allow the systems to interpret web content associated with the software. A content

5 provider can create web content that is associated with the software and deploy the content from its server by obtaining a license from the software provider. The software provider can issue a license key to the content provider, which can be placed on the server to license the content. The license located on the server may allow the client systems that have the software to run the content in a user-friendly manner.

## BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference  
5 characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

FIG. 1 is a diagram illustrating computer systems architecture for a licensing system according to an embodiment of the invention.

10 FIG. 2 is a diagram illustrating examples of software layers that may be included in a runtime environment according to an embodiment of the invention.

FIG. 3 is a flow diagram illustrating the process for licensing content from a server according to an embodiment of the invention.

15 FIG. 4 is a diagram illustrating an example of a web server file directory structure.

FIG. 4a is a diagram illustrating some of the data that may be included in a license file.

FIG. 5 is a flow diagram illustrating the content distribution between the licensing parties according to an embodiment of the invention.

20 FIG. 6 is a schematic view of a computer system suitable for use with the present invention.

FIG. 7 is a schematic diagram illustrating the distribution of content between servers and clients in accordance with an embodiment of the invention.

25 FIG. 8 is a diagram illustrating a computing environment on which the methods and apparatus of the present invention may be used.

## DETAILED DESCRIPTION OF THE INVENTION

A description of preferred embodiments of the invention follows.

### Types of Licenses

5           Software licenses can range from usage-based models to network licensing. For example, licenses can include public licenses, such as general non-exclusive user licenses (GNU licenses), evaluation licenses (demo versions that expire after a period of time), feature licenses (where only certain features of the product are enabled), floating network licenses (where a server has a limited number of licenses to distribute at a  
10          time), personal licenses and pay-per-use licenses. Further types of licenses are described in U.S. Patent Application Nos. 09/267,269 and 09/936,768.

          While these different types of licenses can generally accommodate different customer needs and create additional revenue opportunities for software developers, additional problems remain. Apart from the features of the license, one of the most  
15          complicated aspects of licensing is actually implementing the license in a licensing model, in which the cost benefit analysis accommodates all license participants, i.e. the user, developer and content provider.

### Client Server Architecture

20           The present invention provides a licensing system based on the client 100, server 102 framework. A client computer system 100 is connected to a network 108, such as an intranet, extranet or Internet. The client 100 includes a web interface (usually a browser) 110, runtime environment 114 and operating system 116. Although the runtime environment 114 can be any runtime engine, such as a default runtime  
25          engine associated with the browser 110, Sun Microsystems's Java Virtual Machine™ or Microsoft Corporation's Common Language Runtime™ engine, preferably it is the Surge™ Runtime Environment available from Curl Corporation of Cambridge, Massachusetts. The runtime environment 114 handles the execution of code. It

typically is viewed as the Web middle layer between the web applications 110, 112 and the operating system 116.

The browser 110 often calls the runtime environment 114 and a plug-in or media player 112 to perform certain actions. When the browser 110 attempts to fetch or load digital content from the server 102, the browser 110 processes the content. If the content is associated with specific software, such as a media player or plug-in 112, then the browser 110 can load the plug-in 112 associated with the content type. Control is then passed to the plug-in 112 to process and play the content, and the plug-in can also interface with the runtime environment 114 to facilitate this process. If an appropriate plug-in is not available to the browser 110 on the client computer 100, an appropriate plug-in may be obtained from another source, typically a server 102 on the Internet 108. When a browser fetches content, for example, Curl content, the browser 110 locates and loads a corresponding Curl plug-in.

#### Client Runtime Environment

An example of some of the features that may be included in the client system 100 runtime environment 114 is shown in FIG. 2. The runtime environment 114 can include a multimedia engine 200, which preferably integrates seamlessly with other commercially available Internet technologies that provide multimedia capability (such as 3D graphical capability, animation, audio, etc.). A compiler 210 or execution engine, such as a just-in-time compiler, interprets the source code on the fly. This allows code to be generated dynamically on the server and delivered to the client 100 for execution without any need for pre-compilation. Usually, the compiler 210 can compile instructions into native CPU instructions. A memory allocation and/or defragmentation system 220, such as garbage collection, which ensures that memory resources are utilized optimally, can also be provided. The runtime environment can further include a graphical user interface system 230 that generates most of the graphics on the client 100, instead of being sent down as large files from the server. The runtime environment 114 can include an integrated XML parser 240 to allow direct interpretation of data streams encoded in XML. The XML parser 240 may provide support for related XML



formats, such as Simple Object Access Protocol (SOAP), a lightweight XML-based messaging protocol used to encode information in Web request and response messages.

For advanced application-level client-side functionality that requires more access to client-side resources than normally required, the runtime environment 114 can  
5 employ a security system 250 based on a sandbox model, such as that described in U.S. Patent Application No. 09/672,712, which is incorporated herein by reference in its entirety. This model can limit a downloaded application's access to an end-user's system 100, while providing a mechanism for both unprivileged and privileged use of local client storage. Such applications can include downloaded applications (e.g. plug-  
10 ins or applets).

Referring to FIG. 1, downloaded applications are usually loaded by the browser 110 and delivered to the runtime environment 114 on the client system 100. Preferably, the server is free from much of the processing it typically does because the runtime environment 114 and downloaded application offload most of the processing tasks onto  
15 the client 100. The runtime environment 114 also facilitates offline operations so that the client 100 can be disconnected and still process and display downloaded content.

#### URL Based Licensing

FIG. 3 illustrates the process for licensing content from a server according to an  
20 embodiment of the invention. The client system downloads the digital content from a server at 300. The URL address of the content is used to determine the location of the license at 302. When the license is located, it is downloaded at 304. The system locates the signature of the license and verifies the signature to determine whether the license is valid at 306. By determining that the license is properly signed, the system can  
25 determine if there has been any tampering with, or modification of, the license. If the license is valid, then at 310 the license is used to determine which URL address is valid for the license. A URL pattern that indicates which URL addresses are valid for the license can be coded within the license file. The URL pattern in the license is compared with the URL of the content at 312. If, for example, the URL pattern matches the URL

of the content at 314, then the license is valid. If the license is valid, then at 318 the features and terms of the license can be determined.

Software can be used to perform the licensing process described in FIG. 3. Software can be created or existing software can be modified to handle this licensing process. Referring to FIG. 1, such software can be a browser 110, plug-in or media player 112, runtime environment 114, dynamically linked library (DLL), ActiveX control, or any other form of executable code. The software designed to process the content includes routines and/or objects for recognizing and validating a license 130 from the server 102 and limiting execution of content 120 downloaded from the server 102 pursuant to the validity of the license 130. With the URL of the content 120, the software locates and verifies a license 130 for content that is downloaded from a server 102.

#### Locating the License

Given the URL of the content, the invention can find a license either through the root directory of the domain or the same directory as the content. Based on the prefix of the URL address of the content file, the invention can determine the URL location of the license. Typically, the structure of a URL address includes the communications protocol, hostname, and any sub-domains or subdirectories that appear to the left of the host name:

protocol://www.domain-name:port/sub\_domain/filename

The portion of the URL before the first colon (:) shows which protocol should be used. Although the invention may be compatible with the various URL based protocols, e.g. FTP, telnet, gopher, news, etc., preferably, the URL address is in HTTP protocol. The hostname is the unique name by which a computer, and in this case the server, is known on a network. The sub-domain or subdirectory identifies the path to a file or resource residing on that server. If, for example, the URL of the requested digital content “start.curl” is:

http://www.domain.com/sub\_domain/start.curl

then, the license can be found through the root directory “http://www.domain.com/”

or the subdirectory of the requested content “http://www.domain.com/sub\_domain/”.

The invention looks first through the root directory and if the license is not found there then it looks through the subdirectory.

FIG. 4 illustrates an example of a web server file directory structure. If a license  
5 130a is stored through the Web root directory 142 of the server 102, the license can potentially cover any content 120a, 120b, 120c that is downloaded from that host name 142, so long as the license 130a is valid. Thus, a license 130a stored in the root directory 142 can override a license 130b located elsewhere on the server 102, such as a license in a subdirectory 142a. As a result, a single license can cover several different  
10 URL deployment locations. If the appropriate license is not found through the root web directory 142, then a subdirectory of the URL address of the desired digital content can be searched.

If a client, for example, is attempting to download digital content 120b, and an attempt to find a license through the root 142 was unsuccessful, then the subdirectory  
15 142a of the content 120b can be examined to determine if the appropriate license exists. In this case, license 130b may be the appropriate license. In addition, the license file 130b stored in subdirectory 142a could potentially cover all content 120b, 120c in that subdirectory 142a. Therefore, the placement of a license on a server can be used as a mechanism to enable a single license to cover content from multiple URLs and  
20 directories.

A single license can cover multiple web server directories and also multiple hostnames. This can be achieved by indicating more than one hostname in the license. This can be particularly useful for servers that have several hostnames (e.g. aliases).

## 25 URL Pattern

The license 130 can be examined to determine which deployment locations are covered by the license. The deployment locations can be identified in the license 130 by determining a URL pattern referenced in the license 130. Preferably, the URL pattern determined from the license 130 is a shorthand reference to the licensed content,

such as the hostname of the URL address of the licensed content or a URL prefix that corresponds to the URL of the content.

The URL prefix can be any valid hostname without a wildcard character. Preferably, two hostname components (DNS labels) follow an initial wildcard. For example any of the following URL patterns

`http://acme/products/`

`http://*.acme.com/products/`

use valid URL prefixes for the purposes of licensing.

However,

`http://*.acme/`

`http://*/products/`

are invalid URL prefixes for the purpose of licensing.

The URL pattern in the licensed file 130 can be a complete URL address, which is the same as the URL address of the licensed content. The URL pattern can be the same hostname and subdirectory as the URL address of the content, or it can be the IP address of the content. When the URL pattern includes an IP address, preferably it also includes the hostname of the server.

#### License Data

FIG. 4a shows examples of some of the data that may be included in a license 130. The license 130 includes an expiration date 402 for the license. The expiration date may indicate when the license becomes invalid. This enables the licensor to revoke the license after a certain period of time. If the license is an evaluation license, a grace period may be indicated. For example, a sixty-day time limit can begin the day the license is created.

The license 130 further includes information about a URL pattern 404, which identifies the corresponding URL address of the content that is covered by the terms of the license 130. The URL pattern 404, for example, can be a complete URL address, URL prefix, hostname or IP address associated with the content. One URL pattern 404

may cover more than one URL address. Further, multiple URL patterns 404 may be referenced in the license 130.

The license may include information about the version of the execution engine 406 that is used to process the content. The license can include information about  
5 licensed features 408 and/or restrictions 410. The features 408 and restrictions 410 can define an access policy, which identifies features of the content that are specifically enabled or disabled. Certain features, for example, may be enabled for a particular version of an execution engine 406, and disabled for another version. The restrictions 410, therefore, place limitations on the execution of the content.

10 The licensed features 408 and restrictions 410 can identify a licensing policy associated with the content. A plug-in creator, for instance, may choose a licensing policy that encourages the use of a plug-in for certain purposes, such as for non-commercial use or for product evaluation. The licensed features 408 can identify permissible functionality for executing the content and restrictions 410 can place  
15 limitations on the execution of the content 120. A basic set of functions, for example, that are associated with the content, may be made available under a non-commercial use license while at the same time, withholding access to advanced features.

The features 408 and restrictions 410 can depend on the type of content. For example, extra fees may be required when the content includes three-dimensional  
20 graphics. As a result, the processing of such content may need to be specifically authorized by the terms of the license 130. If the license 130 does not include information about a feature 408 enabling the rendering of three-dimensional graphics, the software running on the client system 100 may not be able to render the three-dimensional graphics of the licensed content 120.

25 The license 130 can be a digitally signed text file that is installed on a HTTP server. The digital signature enables the client side software, such as the runtime environment 114 or media player 112, to verify that the license 130 has been not been altered.

One method of signing involves applying a known cryptographic digesting  
30 algorithm to the content being signed in order to obtain a digest or hash of the content.

The digest is then encrypted using a private key of a signing party to produce a digital signature. Another party may then authenticate the signature by computing the digest of the content using the same algorithm used by the signing party and comparing the results to the result of decrypting the signature with the public key of the signing party.

5    *Applied Cryptography, Second Edition: Protocols, Algorithms, and Source Code in C*, by Bruce Schneier, published by John Wiley & Sons, Inc. in 1996, which is incorporated herein, provides additional information on the use and implementation of digital signatures. Further examples include the Java Cryptographic Extension (JCE) or Microsoft's Cryptographic API (CAPI).

10       The license key 130 can be an encrypted text file. Encryption techniques, such as asymmetric encryption (public-key encryption) or symmetric encryption, may be used.

      According to an embodiment of the invention, the client runtime environment 114 cannot run licensed applications from a server 102 unless the license key 130 is on  
15   the server. The license key 130 permits the runtime environment 114 to run content 120 downloaded from the server 102. The server system 102 serves the licensed content 120 using the license key 130. When the runtime environment 114 gets the content 120, it automatically looks on the server 140 for the license key 130. This licensing method is generally directed to client-server communications using the HTTP, TCP/IP  
20   protocols because if the content was stored locally on the client 100, then the runtime environment 114 would be able to run the content. As long as the content is developed and run from local disk storage 100, no license key is needed. Thus, a license key 130 is not necessarily required to view and use applications or content on the client system 100. The end-user of the client system 100 does not need to obtain a license 130.

25   Rather, the license 130 enables the server 102 to deploy digital content 120 to the client system 100. This licensing scheme enables the provider of software utilized in the interpretation of web content to license the use of that software for commercial purposes without controlling access to either the software or the content. Instead of controlling access to the software or the content, deployment of content from a server is  
30   controlled.

### Licensing Parties

FIG. 5 is a flow diagram illustrating the content distribution between the licensing parties according to an embodiment of the invention. A software developer or technology provider 530 provides a content provider 540 with a license key 130, which  
5 allows the content provider 540 to deploy digital content 120 from its server 102. The technology provider 530 produces software 532 capable of running and rendering the digital content 120 on a client system 100 if there is a license key 130 on the server 102 for the content 120. Thus, the license key 130 enables the software 532 to run the  
10 content 120 downloaded from the server 102. The license 130 can place restrictions on the processing of the content 120 on the client system 100.

The software 532 produced by the technology provider 530 can be any software capable of running the content 120. For example, the software can be a runtime environment 114, browser 110, or media player 112. In one preferred embodiment, the  
15 software 532 is the runtime environment 114. It can be desirable to distribute the software 532 based on a free-licensing scheme because it can increase the market share of the software 532.

The license 130 may be cached on the client system 100. This can be particularly useful when the license 130 refers to multiple URL addresses of content,  
20 such as several applications, that are covered by the license. A cached license can enable the client system 100 to continually access all content 120 covered by the license without having to expend system resources, such as bandwidth, because the client 100 does not need to go back to the server 102 each time it needs to determine that the content is licensed.

25 In one embodiment, the content provider 540 can request a license key 130 from the technology provider 530. In another embodiment, the content provider 540 can request a license key 130 from an automated license server (not shown). It should be understood by one skilled in the art that any one of content technology provider 530, content provider 540, and content user 550 may, at any time, perform the roles of any  
30 other. For example, Curl Corporation, of Cambridge, Massachusetts, and Microsoft

Corporation, of Redmond, Washington, are both content technology providers, content providers, and content users.

In an embodiment of the invention, the technology provider 530 also produces another software product 534, which enables the content provider 540 to create digital content 120 capable of being run by the software 532. For example, the software  
5 product can be an integrated development environment (IDE) used to create the digital media 120 (e.g. any interactive media, applications, objects, applets, data, etc). Curl Corporation's Surge™, Microsoft Corporation's Visual Studio .NET™ and Sun Microsystems's J2EE are examples of IDEs. Preferably, the license 130 is not required  
10 to view and run the content 120 with the IDE 534 or software 532. It can, however, be required to process content deployed from a server 102.

In general, the invention facilitates the widespread use and distribution of digital content 120 while providing technology providers 530 of the software 532 used to play that content 120 with a mechanism for garnering a financial return. This is  
15 accomplished by retaining control over the operations of the software 532 so as to control access to content 120 that requires the software 532.

FIG. 6 is a schematic view of a computer system suitable for use with the present invention. The client computer system 100 may include, among other things, a processor 610, memory 620 and storage system 630. The processor 610 enables  
20 processing of licensing information. The memory 620 enables storing of information and instructions for processor 620. The storage system 630 can be, for example, a magnetic or optical disk system, which stores large amounts of information and instructions on a relatively long-term basis. The processor 610, memory 620, and storage system 630 are coupled to a bus 640, which provides a high-speed means for  
25 devices connected to the bus 640 to communicate with each other. The license 130 may be stored in the memory 620 or cache of the storage system 630 or the server, and this can enable the client to access content on the server 102 that is covered by the license 130.

It should be noted that the client side software 110, 112, 114, 116 shown in FIG.  
30 1, is described as separate layers for purposes of illustration. Any of the software 110,



112, 114, 116 described could perform each other's functions, or there could be one layer of software that performs all of the functions. It should be further noted that although the software 110, 112, 114, 116 is shown above as being implemented on the client system 100, it could be implemented on any system, such as the server 102 or in a distributed computer system.

It will be apparent to one of ordinary skill in the art that the client computer system 100 and server computer system 102 described are illustrative, and alternative systems and architectures may be used with the present invention. For example, FIG. 7 is a schematic diagram illustrating the distribution of content between servers and clients in accordance with an embodiment of the invention. Content providers 540a, 540b create, store and deploy digital content 120d, 120e from their respective server 102a, 102b by storing licenses 130d, 130e. The digital content 120d, 120e is accessed through the Internet 108. Content providers 540a, 540b have web servers 102a, 102b respectively, that execute web server software (not shown) to process requests from users 550a-e of client systems 100a-e. Web servers 102a, 102b respond to these requests by sending the requested content digital content 120d, 120e to the clients 100a-e. The client runtime engines 114a-e run the downloaded content if a valid license 130d, 130e is found on the server.

Generally, the present invention may be used with any configuration of two or more computers, which may be interconnected on one or more networks. FIG. 8 is an illustrative computing environment on which the methods and apparatus of the present invention may be used. Computers 43, 44 and 45, and server 46 are connected to a local area network (LAN) 47. Each of computers 43, 44, 45 may execute software, all or part of which may be stored locally on computers 43, 44 and 45, or may be stored on server 46, and accessed over LAN 47.

LAN 47 is connected to a wide area network (WAN) 48, such as the Internet, through gateway 49, which may be a dedicated device, or may be a computer or server, similar to computers 43, 44 and 45, or server 46. By sending communications across WAN 48, any of the devices connected to LAN 49 may communicate with remote server 50, or with other devices or networks connected to WAN 48. Computers 43, 44

and 45 may gain access to information and software components on other computers through WAN 48.

It will be further apparent to those of ordinary skill in the art that methods involved in the present invention can be embodied in an apparatus or computer program  
5 product that includes a computer usable medium. For example, such a computer usable medium can include a readable memory device, such as a hard drive device, a CD-ROM, a DVD-ROM, or a computer diskette, having computer readable program code segments stored thereon. The computer readable medium can also include a communications or transmission medium, such as a bus or a communications link,  
10 optical, wired, or wireless, having program code segments carried thereon as digital or analog data signals.

While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein, without departing from the  
15 scope of the invention encompassed by the appended claims.